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SEED POTATO DISINFECTION

Wm. H. Martin

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The potato grower who does not adopt every possible measure to reduce the production costs of the crop this year is very likely to encounter difficulties. The wise grower has an eye on the situation in other potato growing sections but at the same time he is doing everything in his power to produce a maximum crop at the lowest possible cost per bushel. He knows that in the advent of succeeding in this he will experience little difficulty in paying his bills.

There are, of course, a number of factors to be considered in arriving at this much to be desired situation. Good soils will help, high class seed is important, proper cultivation and spraying is likewise of unquestioned value. The proper attention to all of these points, however, have frequently failed to produce a crop owing to the fact that the grower neglected one very important operation—seed treatment. In New Jersey last year, fields were observed where fertilizer at 36 dollars a ton was used at the rate of 1800 pounds per acre and five sacks of certified seed at 6 dollars a sack planted. In a number of cases these fields showed as many as 10 per cent of the plants killed by black leg. In other years fields have been observed where as many as 25 per cent of the plants were cut off or seriously weakened by rhizoctonia. Every year we have men who, as the result of planting scabby seed, are compelled to remove from 5 to 50 per cent of tubers when graded in order to meet the requirements of the U. S. Grades. This is bad enough of itself but what is still more serious is the fact that the scab organism has been introduced into the soil, frequently making it almost impossible to produce a clean crop in the future. We mention these cases from New Jersey but the same situation exists in every potato growing section. The losses to the potato crop each year from scab, black leg and rhizoctonia are appalling—especially in view of the fact that they may be prevented to a considerable extent by seed potato disinfection.

The failure to treat seed potatoes in the past possibly resulted from the fact that the operation was a time consuming task. This objection is no longer valid since new and efficient methods have been devised which makes it possible to disinfect large quantities of seed in a short time. The old and new method which are commonly used are given below. There is no reason why one of these methods could not be adapted to local conditions.

Corrosive Sublimate.

Cold Method—4 oz. to 30 gallons of water. Soak for 1½ hours. Remove the potatoes and dry. Since corrosive sublimate loses strength with treatment, provisions must be made to maintain the original concentration. This may be done by adding ½ ounce of chemical after 4-5 bushels treated. Keep the original volume of water constant. In view of the fact that the solution tends to become very muddy, it should be discarded after 8 or 10 lots of potatoes are treated.

Hot Method—4 oz. to 30 gallons of water. Heat to 126 degrees F. Treat the potatoes for two minutes then remove and dry. Where this method is used, care must be taken to maintain the solution at the initial strength.

Formaldehyde.

Hot Method—1 pint to 15 gallons of water. Heat to 121-125 degrees Fahrenheit. Soak the tubers for 2-3 minutes. When the tubers are removed from the solution they should be piled up and covered for one hour. At the end of this time the covers should be removed and the tubers dried. After treating 50 bushels of seed add 9/10 pint of formaldehyde to replace that which is lost. If this is done, the concentration of the solution will be maintained indefinitely.

Of these three methods, cold corrosive sublimate is the one most generally used in the eastern potato growing sections. Some seed has been treated in New York by the hot corrosive sublimate method but the highly corrosive nature of this chemical makes it somewhat difficult to handle. Where heating arrangements are not available there is no question but that the cold corrosive sublimate treatment for 1½ hours will give results. This treatment is as efficient in the control of scab, rhizoctonia and black leg as any of the others mentioned. The time required for treating, the corrosive nature of the chemical and the fact that it changes strength constantly makes it rather cumbersome. It was this fact which led to the development of the hot formaldehyde treatment. This method has been generally adopted in the western states. Where a heating device is available, this method of disinfecting seed potatoes is very efficient. In one community in New Jersey last year over 3000 bushels of seed potatoes were disinfected

in 2 days. The non-corrosive nature of the solution, the ease of maintaining the initial concentration, the short time necessary for the treatment and the fact that formalin is non-poisonous makes this one of the most efficient methods of disinfecting seed potatoes.

Organic Mercury Compounds

Where heating facilities are not available and where a short treatment is desired, there remain the organic mercury compounds. Two of these materials, Bayer Dip-Dust and Du Pont Semesan Bel have been tested for three years at the New Jersey Station. These two materials should be used at the concentration recommended by the manufacturers. The potatoes are dipped into the solution, removed and dried. In New Jersey both uncut and cut seed were treated and while there was apparently no injury from treating the cut seed piece the treatment of the uncut seed seems to be the more satisfactory method. These materials have given as good control of scab as has the hour and a-half treatment in corrosive sublimate and in tests conducted last year in Maine, Oregon, Idaho, Kansas and New Jersey excellent results were secured in the control of seed borne rhizoctonia. A number of the New Jersey growers plan to adopt the dip treatment this year since the dips are not so corrosive as corrosive sublimate, do not lose strength on use and what is still more important, the time element is greatly reduced.

All of the treatments indicated above are good. Where seed carrying any of the three diseases, scab, black leg or rhizoctonia is to be planted it is important that they be treated by one of the methods outlined. Remember that an investment of a dollar and a half an acre now may mean the difference between profit and loss when the crop is harvested.

A TEST OF A HORSE-DRAWN MACHINE FOR PLANTING SEED PLOTS BY TUBER UNITS

Reiner Bonde and Donald Folsom, Orono, Maine

The tuber-unit method of planting seed plots has certain advantages, but requires considerable labor. A machine that has been advertised in this Journal gave promise of reducing the labor required and therefore was tested during the past summer (1926). This machine cuts tubers of a suitable size one at a time into quarters and drops the seed pieces of each tuber into four equally spaced hills. It does this with or without a skip or missing hill after each tuber unit, depending upon the adjustment of the machine. Time records indicate that in comparison with hand planting the machine would reduce the labor cost if it were to be used for several full days each season by a large grower or by a group of growers. The machine also would plant the soil sooner after its preparation, would eliminate exposure of the cut seed, and

would seem less tedious to many growers. The machine can also be considered as a means of extending tuber-unit planting to large areas of certified seed, in addition to small seed plots. In a seed plot the rows planted with the machine compared favorably with those planted by hand. In series of plots with replications, a test was made of the effects of the machine on the surface contour, shape, and degree of uniformity of the seed pieces, and on the spacing of the hills, time of blossoming, height of plants, and yield per acre and per hill. When using the machine in question, leaving skips between successive tuber units resulted in fewer hills per 100 feet of row, in greater yield per hill, and in no significant difference in yield per acre. Comparing the special machine with a normal commercial machine, using parts of the same seed stock for the two, there were fewer hills per 100 feet of row with the adjustment used, the plants were higher, the yield per hill was significantly greater, a fourth less seed was used, and the yield per acre was lower but not significantly so according to Student's method. The time of blossoming was not affected. The conclusion seems justified that the new machine did not decrease the vigor of the plants. Future tests will require more uniform spacing of hills, and a comparison of machine and hand planting of tuber units in replicated plots.

CHANGE OF ADDRESSES

Every now and then a Journal is returned by a Postmaster with a statement that the person to whom the Journal was sent has moved and left no address. In such cases it is almost impossible to locate such a person without the efforts of a Sherlock Holmes. When a change of address is contemplated kindly inform the editor so that a number of the Journal is not missed.

REVIEW OF RESEARCH WORK

Who can abstract a publication better than the author? You know the answer. Therefore every member who publishes any experimental work is urgently requested to send an abstract of it for the American Potato Journal as soon as possible. Relate the important points but tell the story in a "nut-shell" so that it will reveal to the reader more than a mere outline. Since the larger proportion of our members are growers of whom many will never see the original publication, brief results should be given.

ANNUAL REPORTS FOR SALE

These reports contain the addresses given at the Annual Meetings and can be obtained by sending a check to the editor. The price for the 1st, 3d, 4th 8th, 9th, 11th, and 12th is \$1.00 per copy and the tenth \$1.30 postpaid. The Proceedings of the 2nd, 5th, 6th, and 7th. Annual Meetings were never published. This may serve to answer future inquiries.

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Card indexes giving names, addresses and statement of dues of all members in the territory have been sent to the above committee with full instructions. As soon as possible, this committee is urgently requested to collect dues of those in arrears and secure new members.

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CROP AND MARKET NEWS

PRICES ADVANCE. HEAVIER PLANTINGS IN EARLY STATES

(Contribution from the Fruit and Vegetable Division, Bureau of
 Agricultural Economics, U. S. Department of Agriculture)

Potato markets were weak and draggy during most of February,
 but a fairly sharp advance in prices occurred about the 10th of

March. A similar rise came at almost the same time last year. Recent low point was reached during late February, but the rise of prices which occurred after that time brought the level of most sales 10 cents to 25 cents above the corresponding values of a month ago. In other words, the gradual decline during last month was more than offset by the sudden rise of March 5-10.

Bulk Green Mountains were bringing \$2.05-\$2.15 per 100 pounds at northern Maine shipping points, while sacked Round Whites in western New York were selling at \$2.00-\$2.05 and northern stock ranged \$1.75-\$2.10. In the far West, Idaho shippers were getting \$2.00 cash-track for best Russet Burbanks. All these quotations, however, are scarcely more than half those of early March, 1926.

Jobbers in eastern consuming centers were paying anywhere from \$2.25 to \$2.65 per 100 pounds for sacked Round Whites from New York and Pennsylvania. The city price on Maine Green Mountains was \$2.65-\$3.15, and bulk Green Mountains from Long Island had advanced as high as \$3.45 in New York City. The Chicago carlot market quoted northern potatoes at \$2.00-\$2.20, while Idaho Russets ranged \$2.80-\$3.00 in that city. The outlook was much more hopeful than it had been a few weeks before.

Shipments during late February and early March maintained a weekly volume considerably in excess of 4,000 cars, whereas the weekly movement for the same period last season never reached the 4,000 mark. The average for recent weeks has been around 4,400, compared with 3,900 a year ago. During the seven days ended March 5, a total of 4,700 was reached, or nearly one-fourth more than for the same week in 1926. Principal shipping States in the order of importance were Maine, Minnesota, Idaho, Wisconsin, Colorado, and Michigan. About half the week's supply originated in Minnesota and Maine. Leading States during the corresponding week last season ranked in the same order, but the output from Minnesota and Michigan points was only about half what it was during early March, 1927.

Plantings in Southern States

Plantings of early potatoes in 10 southern States are now estimated at 247,830 acres, compared with 230,600 last year and a four-year average of 211,000. The greater part of the 7 per cent increase over 1926 is in southern Texas and in Florida. California also shows a considerable gain. In fact, that State may devote 50 per cent more land to early potatoes than during any recent season. North Carolina may have 8 per cent or 2,300 acres more than in 1926, but Virginia expects a decrease of nearly 8,000 acres or 8 per cent less than last year. More than one-third of the total plantings of early potatoes are in Virginia, that State alone having 92,000 acres of this crop. Unfavorable weather has slightly delayed the Florida crop, but South Carolina potatoes are expected to be ready for market earlier than usual, which may cause considerable

over-lapping in the South. Florida Spaulding Rose brought \$16.00 or \$17.00 per barrel during early March, while a few cities quoted Bermuda and Cuban Bliss Triumphs at \$14.00 a barrel and \$4.75 per bushel crate, respectively.

Preliminary reports from the South show the following approximate acreages for this season, compared with plantings during the last four years. All figures are subject to change, according to future reports:

Early Irish Potatoes in Southern States

State	1923 acres	1924 acres	1925 acres	1926 acres	1927 intended
Alabama	7,140	12,500	8,940	12,750	12,750
California	11,000	11,000	11,850	13,780	20,780
Georgia	2,730	2,630	2,010	2,250	2,250
Louisiana	11,000	15,510	15,630	20,000	21,860
Mississippi	1,200	1,300	1,240	1,300	1,800
North Carolina	16,340	26,000	22,100	29,000	31,320
South Carolina	15,520	21,130	14,860	18,720	18,720
Texas, other	7,350	7,120	3,680	3,980	5,180
Virginia	92,300	100,520	90,050	99,400	91,750
Total	164,580	197,710	170,360	201,180	206,410
Previously reported:					
Florida	19,310	28,000	21,920	23,070	27,000
*Texas, Lower Rio Grande Valley ..	2,880	2,680	6,580	6,350	14,420
Total	186,770	228,390	198,860	230,600	247,830

* Spring crop; does not include fall and winter crop.

About a month ago, the U. S. Department of Agriculture issued its customary report on the estimated holdings of potatoes January 1. The data are summarized as follows: Merchantable stocks of potatoes in 35 late States on January 1 are estimated to have been about 12,380,000 bushels heavier than on January 1, 1926, but 36,830,000 bushels lighter than two years ago following the huge crop of 1924. The excess over the merchantable stocks last season is approximately 20,600 carloads, but the difference between this year's holdings and those of 1925 equals some 61,000 carloads. Not all of this 20,600 carloads excess will be shipped, of course, but possibly half will reach the city markets.

January Merchantable stocks amounted to 82,400,000 bushels, or 17,000,000 less than the average for the last seven years. The 19 surplus-producing States, with 72,200,000 bushels on hand January 1, had about 9,000,000 more than a year ago. The 16 deficient late-potato States, with 10,200,000 bushels, showed an excess of 3,300,000 over the 1926 total. In this last group, the January 1 holdings were only slightly below the seven-year average, but the 19 surplus States were at least 16,000,000 bushels below average holdings. Total merchantable stocks corresponded most closely

to those on January 1, 1922, during which season also the main-crop States had relatively light production. It will be remembered that the price of old potatoes declined almost continuously during the spring of 1922, with the May price considerably below the January level. Part of this decline, however, was caused by the heavy crop and abundant supplies of southern new potatoes and by the business depression and prevailing low prices of commodities at the time.

Because of the heavier northern crop in 1926, the total quantity unfit for food or seed, or lost by shrinkage and decay to January 1, was about 11 per cent greater than in 1925. The actual volume thus to be deducted is about 35,000,000 bushels, compared with 31,600,000 in 1925. Around 52,000,000 bushels have been saved for food in the locality where grown, which is a little below the quantity reserved for that purpose last season. The figures on stocks saved for planting indicate heavier acreage in the late-potato States the coming season. Nearly 30,500,000 bushels have been reserved for seed, or about 13 per cent more than a year ago. Slightly more than 71 per cent of this season's potatoes met requirements of U. S. Grade No. 1, as against 68 per cent of the 1925 crop.

Combined carlot shipments from the late-potato territory to January 1 were about the same as the year before,—109,500 cars. By March 5, however, these 35 States registered a net increase of some 6,600 cars over the movement to the same time last season, and the 20,600 carloads excess merchantable stock on hand January 1 has been reduced by this 6,600 cars.

Maine growers and shippers are planning a publicity campaign by which it is hoped to increase the consumption of their potatoes, even though January 1 merchantable stocks in that State were only 1,000,000 bushels heavier than the year before. Holdings in New York and in Wisconsin were about 2,300,000 bushels greater than the 1926 figure, while Michigan had nearly 3,000,000 more than a year ago. Minnesota's excess stocks over those of the 1925-26 season were about 1,000,000 bushels, and buyers are assembling in the Red River Valley for the spring shipping period. Colorado and Nebraska together seem to have about 2,000,000 bushels fewer potatoes than on January 1, 1926, but Idaho has a considerable excess. The outlook is for rather heavy shipments from now to the end of the season.

The Division of Crop and Livestock Estimates released on March 10 a report showing the estimated March 1 holdings of potatoes. It should be observed that these figures include stock held for seed and food, as well as stocks available for sale. To that extent they are on a different basis than the report of January 1 merchantable stocks and they should not be compared with the January 1 figures.

Estimated Total Holdings of Potatoes, March 1

March 1	Total U. S. (bushels)	19 Surplus late states (bushels)	16 deficient states (bushels)
1927 :	86,948,000	69,684,000	14,357,000
1926 :	68,709,000	56,049,000	11,001,000
1925 :	131,088,000	104,350,000	23,578,000

The remaining March 1 holdings were in 13 southern States, chiefly in Tennessee and North Carolina.

THE KAW VALLEY PREPARES FOR 1927

Kansas.—A series of meetings were recently held in the Kaw Valley Potato territory. Discussions on disease control, soil fertility and marketing were led by specialists from the Kansas State College.

Early indications are that there will be a ten per cent increase in acreage in the Kaw Valley in 1927. The increase will be quite general with heaviest increases in Johnson and Jefferson counties.

A number of growers will test the organic mercury compounds as seed disinfectants. The hot-formaldehyde treatment is being generally recommended by Dr. R. P. White. **Fall treatment or early spring treatment** is preferable to treatment just before planting.

Spindle tuber is cutting yields in Kansas according to C. E. Graves, Extension Pathologist. In 1926 spindle tubers yielded only one third to one half as much as good tubers. Securing seed from a known source and sorting out of spindle tubers before planting were given as control measures.

Sweet clover, alfalfa, cow peas and soy beans are being recommended by E. B. Wells as soil builders. Sweet clover has been used with decided success. Not only have yields been increased but also the quality of the crop has been greatly improved by the use of sweet clover.

Seasonal weakness has been experienced in the Kaw Valley potato market in the past seven years in the third ten days of July. This has occurred every year. In recording average receipts at Chicago it was determined that the third ten days of July have been heaviest at this period of the Kaw Valley marketing season. A recovery in prices has taken place five times out of the past seven years during the first ten days of August. This appears reasonable when it is learned that Chicago potato receipts fall down to a low point of the season during the first ten days of August.

A bill to require all carloads of potatoes to be inspected is now before the Kansas legislature. The purpose is to promote truth in quotations, and to encourage better grading. In 1926 U. S. No. 1 potatoes out sold partly graded stock 80 per cent of the time.

—E. A. Stokdyk, February 21.

Chicago, Ill.—It may be of interest to readers of the "American Potato Journal" to learn of a shipment of Bill Spud Certified Irish Cobbler and Green Mountain seed potatoes that we are making next week to Ecuador, S. A., via New Orleans.

We have had some business in Mexico for some seasons past and in recent years our inquiries show a general awakening to the fact that it pays to plant quality seed.

The demand this year from southern sections for such stock as our Bill Spud Certified Seed has increased considerably. This demand can be further developed by encouraging county agents in the southern states to plant experimental plots for demonstration purposes to their growers. By this method, a demand has been actually started in several sections. We are always glad to furnish county agents seed for such purposes and co-operate with them.—**E. P. Miller, February 26.**

Louisiana.—The Fifth Annual Potato Tour will be conducted during the week beginning April 18. Plans are being made to have the 1927 tour the biggest and best ever held in the state. This tour will feature our million dollar certified Triumph seed potato project and we believe that this annual tour is the greatest potato event of the south.

Fields of potatoes grown from the best of certified Triumph seed from Mont., Nebr., N. D., Minn., and Wisconsin will be under observation.

For further particulars write Prof. G. L. Tiebout, Louisiana Univ., Baton Rouge, La.

Maine.—"Growers, shippers, other business men, banks, railroads and city dealers in Maine are cooperating and subscribing liberally to a publicity fund to advertise Maine's potatoes. The present objective is \$100,000 for a two year campaign. Shippers are subscribing on the basis of 25 cents a car for 2 years or 50 cents a car for 1 year."—The Official Record, 6: 9, Mar. 2, 1927, Washington, D. C.

TENNESSEE.—There are many requests for early varieties of certified seed potatoes such as Triumph and Irish Cobbler. Seed dealers in this state are not stocking certified seed extensively to date; therefore, small growers are having difficulty in obtaining certified seed to fill their needs. Where dealers do stock certified seed we are referring numerous requests for seed to them. This in time may encourage dealers to handle such seed. At present, however, there seems to be a missing link between the producer of certified seed and the small grower who would like to use a few bushels of such seed. Station men are not in position to make these contacts other than to refer small growers to producers or associations handling certified seed. This is not very satisfactory, as the cost of making small shipments is often more than the cost of the seed and discourages prospective users of certified seed.—**J. A. McClintock, March 2.**

Virginia.—Present indications are that there will be a slight decrease in acreage this year. Some of the growers are worried because of the heavy snowfall which occurred on Wednesday fearing that some of the seed in the ground may be injured.—**H. H. Zimmerman, March 4.**

REVIEW OF RECENT LITERATURE

APPLEMAN, C. O. AND MILLER, E. V.—A Chemical and Physiological Study of Maturity in Potatoes.—*Jour. Agr. Research*, Vol. 33, No. 6, pp. 569-577. Sept. 15, 1926.

The question of superiority of immature potatoes for seed was investigated from a chemical and physiological standpoint. Irish Cobblers were used, the potatoes being dug at six stages of maturity, beginning June 17 when the plants were in full blossom and ending on August 27 when the vines were entirely brown and dry. Chemical analyses were made of these six lots, immediately after digging and at the end of the rest period, October 26th. The respiration rates of mature and immature potatoes were compared immediately after digging, and after storage at 36 degrees F. for four months. The results show that ripening and maturing processes in potatoes may continue during storage, so that by the end of the rest period immature potatoes large enough for seed have practically the same percentage compositions and respiratory response allowed to mature on the vine if both are stored under the same conditions. The data do not reveal any chemical or physiological basis for the superiority of immature potatoes for seed.—**U. T. Pentzer**

(Potato investigations in Arkansas).—*Arkansas Sta. Bul. 215 (1926)*, pp. 49-50.

Fertilizer recommendations are made for potatoes on different soil types in the State. Certified northern seed again outyielded good commercial northern stock. During attempts to obtain immediate growth in freshly dug potatoes, the ethylene chlorohydrin method developed by Denny at the Boyce Thompson Institute resulted in 100 per cent germination of freshly dug potatoes within 10 days after treatment. It appeared that the ethylene treatment should be made at below 70 degrees F., although the germination of the treated seed proceeds most rapidly at soil temperature of about 80 degrees. Of the other methods tried, storing freshly dug tubers in a dry place at 80 to 90 degrees with free air circulation has excelled. Tubers stored 4 weeks will sprout in 5 to 7 days provided the soil temperature is high.—**Henry M. Steece**